

CLAIMS

I claim:

1. A multi temperature zone refrigeration system comprising:

a container with at least two different temperature cooling zones;

5 a divider separating the at least two cooling zones, where the divider has a wall and a partition spaced therefrom to define a heat exchange chamber, the partition being formed of a heat transfer plate having a sheet and a heat transfer substance attached to the sheet;

a compressor system having refrigeration and hot-gas defrost modes, where the compressor system is in communication with at least one of the cooling zones; and

10 a controller functionally connected to the compressor system for selectively operating the compressor system.

2. The refrigeration system of claim 1 where the compressor system has a variable capacity compressor.

3. The refrigeration system of claim 1, where the compressor system comprises:

15 a variable capacity compressor;

a condenser;

a heat exchanger; and,

an evaporator,

where the variable capacity compressor is connected to the condenser, the condenser is connected to the heat exchanger, the heat exchanger is connected to the evaporator, and the evaporator is connected to the variable capacity compressor thereby forming a closed system in which refrigerant travels.

5 4. The refrigeration system of claim 3, where the compressor system further comprises:

a drier positioned between the condenser and the evaporator and connected to the condenser and evaporator; and,

a hot-gas bypass valve connected to the drier and the evaporator,

where the hot-gas bypass valve and heat exchanger are connected in parallel to the drier

10 and evaporator.

5. The refrigeration system of claim 1 where the heat transfer substance is insulation.

6. The refrigeration system of claim 5 where the insulation is closed cell urethane.

7. The refrigeration system of claim 7 where the closed cell urethane is Armaflex.

8. The refrigeration system of claim 7 where about $\frac{1}{2}$ inch to 1 inch of Armaflex is engaged to the metal sheet of the heat transfer substance.

15 9. A compressor system comprising a closed system having an evaporator functionally engaged to a variable capacity compressor, where the compressor system selectively operates in at least a refrigeration mode and a hot-gas defrost mode and the evaporator is defrosted by circulation of gas therethrough.

10. The compressor system of claim 9 comprising:

a variable capacity compressor;

a condenser;

a drier;

5 a hot-gas bypass valve;

a heat exchanger; and,

an evaporator,

where the variable capacity compressor is connected to the condenser, the condenser is

connected to a drier, the drier is connected to a hot-gas bypass valve and heat exchanger in

10 parallel, the hot-gas bypass valve and heat exchanger are connected to the evaporator, and the
evaporator is connected to the variable capacity compressor thereby forming a closed system in
which refrigerant travels.

11. The compressor system of claim 10 further comprising a controller functionally

engaged to the hot-gas bypass valve where the controller selectively opens and closes the hot-gas

15 bypass valve.

12. A temperature divider comprising:

a wall;

a partition spaced a distance from the wall, the partition having at least one metal sheet with a heat transfer substance attached thereto; and,

a heat exchange chamber defined by the wall and partition.

13. The temperature divider of claim 12 further comprising a damper positioned in the
5 partition.

14. The temperature divider of claim 12 further comprising a vent positioned in the wall.

15. The temperature divider of claim 12 where the heat transfer substance is insulation.

16. The temperature divider of claim 12 where the insulation is closed cell urethane.

17. The temperature divider of claim 12 where the closed cell urethane is Armaflex.

10 18. The temperature divider of claim 12 further comprising a fan positioned in the wall.

19. A multi temperature zone refrigeration system comprising:

a cabinet with at least two different temperature cooling zones;

a single compressor system engaged to the cabinet for cooling the at least two temperature cooling zones; and,

15 a temperature divider positioned between and separating the at least two different temperature cooling zones, the temperature divider having a wall, a partition spaced a distance from the wall, the partition having at least one metal sheet with a heat transfer substance attached thereto, and a heat exchange chamber defined by the wall and partition.

20. The multi temperature zone refrigeration system of claim 19 where the heat transfer substance is closed cell urethane.

21. The multi temperature zone refrigeration system of claim 19 further comprising a fan positioned in the wall.

5 22. The multi temperature zone refrigeration system of claim 19 further comprising a damper positioned in the partition and a vent positioned in the wall to allow air to circulate there through.

23. The multi temperature zone refrigeration system of claim 19 where the compressor system comprises:

10 a variable capacity compressor;

a condenser;

a drier;

a hot-gas bypass valve;

a heat exchanger; and,

15 an evaporator,

where the variable capacity compressor is connected to the condenser, the condenser is connected to the drier, the drier is connected to the hot-gas bypass valve and the heat exchanger in parallel, the hot-gas bypass valve and heat exchanger are connected to the evaporator, and the

evaporator is connected to the variable capacity compressor thereby forming a closed system in which refrigerant travels.

24. The multi temperature zone refrigeration system of claim 23 where the compressor system further comprises a controller functionally engaged to the hot-gas bypass valve where the
5 controller selectively opens and closes the hot-gas bypass valve.

25. The multi temperature zone refrigeration system of claim 19 where the cabinet has three different temperature cooling zones and one temperature zone is a freezer maintained between about -5° F and 5° F, one temperature zone is a refrigerator maintained between about 34° F and 38° F, and one temperature zone is a chiller maintained between about 45° F and 65° F.

10 26. The multi temperature zone refrigeration system of claim 19 where the heat transfer substance is between about $\frac{1}{2}$ inch and 1 inch thick.

27. A multi temperature zone refrigeration system comprising:

a cabinet with at least two different temperature cooling zones;

a cooling system engaged to the cabinet; and,

15 a temperature divider positioned between and separating the at least two different temperature cooling zones, the temperature divider having a wall, a partition spaced a distance from the wall, the partition having at least one metal sheet with a heat transfer substance of closed cell urethane attached thereto, and a heat exchange chamber defined by the wall and partition.

28. The multi temperature zone refrigeration system of claim 27 where the cooling system is a compressor system comprising a closed system having an evaporator functionally engages to a variable capacity compressor, where compressor system selectively operates in at least a refrigeration mode and a hot-gas defrost mode an the evaporator is defrosted by circulated
5 gas there through.

29. The multi temperature zone refrigeration system of claim 27 where the compressor system comprises:

a variable capacity compressor;

a condenser;

10 a drier;

a hot-gas bypass valve;

a heat exchanger;

an evaporator;

where the variable capacity compressor is connected to the condenser, the condenser is
15 connected to the drier, the drier is connected to the hot-gas bypass valve and the heat exchanger in parallel, the hot-gas by-pass valve and heat exchanger are connected to the evaporator, and the evaporator is connected to the variable capacity compressor thereby forming a closed system in which refrigerant travels; and,

a controller functionally engaged to the hot-gas by-pass valve where the controller selectively opens and closes the hot-gas bypass valve.

30. A method of defrosting a variable capacity compressor cooling system with gas comprising the steps of:

- 5 having a controller signal a hot-gas bypass valve to selectively open;
- having a variable capacity compressor compress relatively low pressure gas into a relatively high pressure gas;
- circulating the high pressure gas from the variable capacity compressor into a condenser, then into a drier, through the open hot-gas bypass valve, and into an evaporator;
- 10 melting accumulated frost on the evaporator and thereby reducing the pressure of the gas; and,
- returning the relatively low pressure gas to the variable capacity compressor.